Appendix A

# LIST OF ACRONYMS


## SUMMARY

This Appendix provides a list of acronyms used in this handbook. Detailed definitions may be found in Appendix B, "Glossary."

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|---|---|
| AMSD | Aerospace Mechanical Systems Division |
| AO | Announcement of Opportunity |
| APA | Allowance for Program Adjustment |
| ATP | Authority to Proceed |
| CAE | Computer-Aided Engineering |
| CDR | Critical Design Review |
| CEI | Contract End Item |
| CIL | Critical Item List |
| CoDR | Conceptual Design Review |
| COTR | Contracting Officer's Technical Representative |
| CSC | Computer Software Component |
| CSCI | Computer Software Configuration Item |
| CSU | Computer Software Unit |
| DPC | Data Processing Center |
| EHB | Engineering Handbook |
| EMI | Electromagnetic Interference |
| FCA | Functional Configuration Audit |
| FFT | Fast Fourier Transform |
| FID | Field Installation Director |
| FIR | Finite Impulse Response |
| FMEA | Failure Mode and Effects Analysis |
| FRR | Flight Readiness Review |
| GDR | Group Directors' Review |
| GFP | Government Furnished Property |
| GSE | Ground Support Equipment |
| HFI | Host Field Installation |
| ICD | Interface Control Document |
| IIR | Infinite Impulse Response |
| IRD | Interface Requirements Document |
| JSC | Johnson Space Center |
| KSC | Kennedy Space Center |
| LaRC | Langley Research Center |
| LASE | Lidar Atmospheric Sensing Experiment |
| LIDAR | Light Detection And Ranging |
| LLR | Lessons Learned Review |
| LAPD | Langley Policy Directive |
| LAPG | Langley Procedures and Guidelines |
| LRR | Launch Readiness Review |
| MCR | Mission Control Room |
| MNS | Mission Needs Statement |
| NAR | Non-Advocate Review |
| NFR | Nonconformance Failure Report |
| NPD | NASA Policy Directive |
| NPG | NASA Procedures and Guidelines |
| NOC | Next Operational Concept |
| NSTS | National Space Transportation System |

| | |
|---|---|
| NSY | New Start Year |
| OAR | Operational Acceptance Review |
| OBS | Organizational Breakdown Structure |
| OMB | Office of Management and Budget |
| ORR | Operational Readiness Review |
| OSEMA | Office of Safety, Environment and Mission Assurance |
| PAA | Program Associate Administrator |
| PCA | Physical Configuration Audit |
| PDR | Preliminary Design Review |
| PIA | Project Initiation Agreement |
| POCC | Payload Operations Control Center |
| POP | Program Operating Plan |
| PSRR | Preliminary Systems Requirements Review; Pre-Shipment Readiness Review |
| RFA | Request For Action |
| RTOP | Research and Technology Operating Plan |
| SAR | Software Acceptance Review; System Acceptance Review |
| SCDR | Software Critical Design Review |
| SCR | Software Concept Review |
| SEAL | Software Engineering and Ada Laboratory |
| SEB | Source Evaluation Board |
| SEC | Source Evaluation Committee |
| SEIRC | Space-flight Experiment Initiatives Review Committee |
| SEMP | Systems Engineering Management Plan |
| SGDR | Sponsoring Group Director's Review |
| SID | Systems Integration Document |
| SPDR | Software Preliminary Design Review |
| SPF | Single Point Failure |
| SQL | Structured Query Language |
| SRR | Software Requirements Review; Systems Requirements Review |
| SSO | Source Selection Official |
| STRR | Software Test Readiness Review |
| TBD | To Be Determined |
| TCM | Test Coordination Meeting |
| TQM | Total Quality Management |
| TRR | Test Readiness Review |
| VLSIC | Very Large-Scale Integrated Circuits |
| WBS | Work Breakdown Structure |

Appendix B

# GLOSSARY OF TERMINOLOGY


## SUMMARY

This Appendix contains an alphabetical listing of systems engineering and project terminology used in this handbook with working definitions and related acronyms.

Administrative Requirements - Those non-technical conditions, such as cost and schedule constraints, which are imposed on a project.

Advocate - A person who speaks and writes in support of the science or technology goals of a program.

Allowance for Program Adjustment (APA) - Resources allocated for: expansions in project requirements resulting from NASA Headquarters approved changes in project objectives or scope; the resolution of unforeseen major problems; project stretch outs from Agency funding shortfalls, etc. These resources are managed by the NASA Headquarters Program Office.

Alternate Concepts Analysis List - Summary of tradeoff studies and quantitative comparison of the alternate systems concepts initially prepared in Pre-Phase A and finalized in Phase B.

Alternate Concepts List - Summary of potential systems concepts generated during Pre-Phase A as the basis for further design tradeoff studies.

Alternative Concept - One of a number of generalized system configurations that is analyzed against the technical, budgetary, and schedule requirements and goals of a project and summarized in the Concept Analysis Document.

Announcement of Opportunity - The process by which proposed investigations are solicited for a future space flight.

As-Built Drawings - An updated version of the Build-To Drawings which reflect any alterations incurred in fabrication and are completely consistent with the hardware as it exists.

As-Built Project Baseline - The in-house configuration baseline which constitutes the actual flight hardware, flight software, and ground support end items as delivered.

As-Designed Project Baseline - The in-house preliminary configuration baseline which defines the hardware and software during the implementation phases. The preliminary baseline document is subject to continuous change control and is updated formally at reviews as the system configuration is incrementally developed.

Assembly - A number of parts, or subassemblies, joined together to form a complete unit or article which can perform a specific function.

Baseline - A set of documents that define an item and are formally designated and fixed at a specific time in the project life cycle, serve as the basis for further development, and are changed only by formal change control procedures.

Baseline Systems Concept - The baseline system design selected at the end of Phase B and proposed for implementation in Phase C.

Brassboard - A hardware assembly of preliminary circuits or parts to prove out a specific function. More sophisticated than breadboards, brass-boards begin to approach the challenge of form and fit, as well as function.
Breadboard - A hardware assembly of preliminary circuits or parts used to prove the feasibility of a device, circuit, system, or principle. It is a function-only model with no attempt to have form or fit.

Budget - The available amount of an operational system commodity such as weight, power, volume, heating capacity, or cooling capacity.

Build-To Drawings - Engineering drawings used to fabricate a given part, assembly, or subsystem.

Computer Software Component (CSC) - A functional or logically distinct part of a computer software configuration item.

Computer Software Configuration Item (CSCI) - A collection of software elements treated as a unit for the purpose of configuration management.

Computer Software Unit (CSU) - The smallest logical entity specified in the design of a computer software component and the actual entity in code that implements a testable aspect of the requirements.

Concept Analysis Document - A document reporting the results of the alternate concept studies, typically including WBS, schedule, cost, and technical performance measures estimates.

Concept Ranking Report - A document reporting the order in which the alternate concepts best fulfill the project requirements, including justification for the ranking.

Concepts List - See Alternate Concepts List.

Conceptual Design Review (CoDR) - A formal critique of the system occurring in Phase B to determine the adequacy of the overall system conceptual design and project progress. See Systems Requirements Review.

Configuration Item (CI) - A collection of parts treated as a unit for configuration control. Also referred to as Computer Software Configuration Item (CSCI) and Hardware Configuration Item (HWCI).

Configuration Management - The process of identifying and defining the deliverable product set in a system, controlling the release and change of those items throughout the life cycle, recording and reporting the status of product items and change requests, and verifying the completeness and

correctness of the product items.

Configured Hardware/Software - An arrangement of various elements of computer hardware and software integrated in such a manner as to best satisfy particular needs.

Constituency - Those persons or organizations that will be served by the project and affected by fulfillment of the top goal.

Constraints - The restrictions and boundaries that place limitations on the system development, such as budget, schedule, performance, and so forth.
Contingency Plans - Recovery procedures to be followed to minimize damage in the event that a major risk concern proves valid.

Contract End Item (CEI) - An article that is purchased under project acquisition control.

Contracting Officer's Technical Representative (COTR) - Primary technical adviser to the Contracting Officer and the person responsible for technical direction of the Contractor.

Control Gate - A formal review conducted to evaluate status and to approve that the project may proceed according to the project plan.

Cost - The consumption of resources expressed in terms of dollars or time.

Critical Design Review (CDR) - A formal critique of the system occurring in late Phase C to determine the adequacy of the overall system design and project progress, prior to complete fabrication and integration of the flight hardware. A series of reviews may be held to address specific segments or lesser entities of the system hierarchy.

Critical Items List (CIL) - An analysis derived from the Failure Modes and Effects Analysis which identifies the rationale or justification for retaining critical items.

Data - Unprocessed facts, figures, and measurements gathered during the course of a project that includes the goals, activities, and results.

Data Validation Report - Post-flight analysis and report to validate the operational science and technology data in accordance with the requirements of the Verification and Validation Plan.

Decision Analysis - A structured procedure for determining the best of a number of feasible alternatives relative to project objectives.

Decision Analysis Report - Summary report issued in Phase A to rank potential systems concepts and assess the feasibility of proceeding to Phase B. This is reviewed and updated in Phase B.

Decision Point - See Control Gate.

Derived Requirements - Additional requirements identified as additional system architecture/design is introduced in the system design process. Also referred to as specified requirements.

Design Specifications - Documentation delineating a precise, detailed, and verifiable description of the pertinent design parameters needed to purchase or fabricate a given hardware part, software unit, or configuration item.

Development Cost Commitment (DCC) - The cost ceiling established by the Administrator for the total costs to be incurred in Phase B through Phase D of the project life cycle.

Element - A complete, integrated set of subsystems capable of accomplishing an operational role or function.

Engineering Model - A complete very high fidelity form, fit, and functions hardware model which resembles the flight article in all respects but which does not necessarily have flight quality parts. It is not generally used as the final qualification article.

Error Allocation Plan - Document which allocates the system level error budget to segments, elements, and subsystems.

Experiment Maturity - The extent of development of the project experiment indicating the level of confidence that the science goals can be successfully accomplished.

Failure - The inability of a system or part to perform in accordance with specification requirements; a functional test or operating discrepancy.

Failure Modes and Effects Analysis (FMEA) - A procedure by which each potential failure mode in a system or subsystem is identified and the results or effects on the system are determined.

Flight Classification - The formal category assigned to a project that delineates its relative importance to national space goals or its relative hazard severity. See Payload Classifications.

Flight Hardware - All physical/material equipment that will be launched to satisfy project objectives.

Flight Operations - See Mission Operations.

Flight Readiness Review (FRR) - Formal review to assess the overall readiness of the project to perform its science/mission objectives.

Flight Software - All computer programs, including computer system operations and mission dedicated applications used for control, communications, data acquisition, analysis, and so forth.

Formulation Phases - The initial stages of the project life cycle when the emphasis is on requirements analysis, project planning, concept definition, feasibility demonstration, and preliminary design. Includes Pre-Phase A, Phase A, and Phase B.

Functional Analysis - A structured approach to the description of a system whereby the operation is progressively broken down to its lowest tasks for the purpose of system analysis and synthesis.

Functional Configuration Audit (FCA) - The control gate that verifies the acceptance test results are consistent with the test requirements previously approved at the PDR and CDR.

Functional Requirements - Those system requirements which express what system capabilities are necessary in order to achieve a goal.
Goal - A qualitative statement of the project's basic purpose and desired end result.

Goals Analysis - A structured examination of the statement of project goals, initially occurring at project inception.

Goals Analysis Document - A report that gives details of the project goals. The contents include the project background, vision, project goals hierarchy, and identified constraints. May include the Performance Measures Statement.

Goals Hierarchy - A diagrammatic representation of project goals starting with the most general purpose, progressing to more specific goals, and terminating with project requirements.

Ground Operations - All components of the project related to the conduct of integrated logistics support including the interfaces with the users, sustaining engineering, preflight/ post-flight data processing, and transportation services.

Group Directors' Review - A formal presentation made to the LaRC Group Directors for the purpose of obtaining endorsement to proceed to the LaRC Center Director's Review, and ultimately to NASA Headquarters.

Host Field Installation - The NASA field installation participating in a multiple field installation program which is responsible for providing the institutional resources for the Program Manager function.

Impact - The anticipated scientific, technological, and social changes that

would occur due to the successful completion of the project or the change in performance, schedule, or cost due to the modification of requirements.

Implementation Phases - The final stages of the project life cycle when hardware and software items are designed, fabricated, integrated, verified; undergoes preflight operations; becomes operational; and the mission is completed. Includes Phase C, Phase D, and Phase E.

Information - Data which has been processed in such a way as to provide an increased understanding of an area of interest.

In-House Project - A project conducted on-site or in the immediate vicinity of a field installation in which essentially most major technical, business, and management tasks normally performed by a prime contractor are performed by the installation's civil service staff.

Instrument - The portion of the flight system--hardware and software--responsible for the measurement and capture of the data needed to satisfy the science and technology requirements.

Instrument Requirements - Those requirements imposed on the instrument for the purpose of achieving the science/technology goals by obtaining the necessary measurements and data.

Interface Control Document - The document which defines the internal and external interface design to a level of detail sufficient to integrate and assemble the system.

Interfaces - The common boundaries and connections between various portions of a system.

LaRC Center Director's Review - A formal presentation made to the LaRC Center Director for the purpose of obtaining authority to pursue funding from NASA Headquarters.

Launch Readiness Review (LRR) - Review held to assess readiness of the launch vehicle, spacecraft, and ground systems for launch and space flight. Also referred to as Preflight Review. See Flight Readiness Review.

Launch Vehicle - The physical means, such as various rocket systems or the National Space Transportation System (NSTS), whereby the flight spacecraft is placed into space.

Lessons Learned Review (LLR) - A final review to collect and disseminate information on experiences gained during the project lifetime and to provide an overview of the lessons learned.

Measurements - Physical characteristics recorded during a mission for the purpose of providing information relevant to the science goals.

Memorandum of Understanding (MOU) - A formal documented agreement between two parties which prescribes the specific roles and responsibilities of cooperative efforts. Also referred to as Memorandum of Agreement (MOA).

Mission - The specific sequence of events which the flight system must execute in order to accomplish the goals of the project.

Mission Need Statement (MNS) - The document that establishes the justification for undertaking an Agency objective or effectively pursuing an opportunity pertaining to an Agency objective. It is the document that grants authority to initiate a Phase B effort for a candidate project.

Mission Operations - Those activities necessary to carry out the mission flight plan from pre-launch through landing or termination.

Mission Operations Plan - A composite set of planned space and ground support operations.

Mission Requirements - Those requirements imposed on the flight system that describe what the system must accomplish in order to achieve the science/technology goals.

Modeling - The evaluation of a system concept by creating a mathematical representation of the system characteristics and simulating the conditions of interest.

NASA Headquarters Review - A formal presentation made to NASA Headquarters personnel for the purpose of obtaining funding for a particular project.

NASA Project Life Cycle - All phases of a NASA project including research, development, design, evaluation, production, test, deployment, operation, data analysis, validation, and disposal.

New Start Proposal - Proposal prepared at the end of Phase B for presentation to NASA Headquarters for the purpose of obtaining Phase C project funding.

New Start Year (NSY) - Year designated in the NASA budget cycle for an approved project to receive funding to begin the implementation phases of the effort.

Non-Advocate Package - Materials and information presented to the NASA Headquarters Associate Administrator's non-advocate committee for the purpose of independent assessment of the feasibility and worth of the proposed project. A review of a proposed major system project by a non-advocate team appointed by and reporting to the Deputy Administrator. The Non-Advocate Review team is comprised of experienced project management, technical, and budget personnel drawn on an ad hoc basis from

organizations that will not participate in the implementation of the proposed project. These reviews provide Agency management with independent assessments of the adequacy of the project formulation effort.

Nonconformance - A nonfunctional workmanship condition of any item (hardware or software) in which one or more characteristics does not conform to drawing specification or procedure requirements; a fabrication or assembly discrepancy reported on NASA Langley Form 143, "Nonconformance-Failure Report (NFR)."

Objectives - Specific, quantitative, and verifiable tasks that lead to accomplishment of the overall project goal.

Operational Acceptance Review (OAR) - Review held after the spacecraft is in orbit to verify systems performance prior to acceptance of the system for operational use. Also known as the Post-flight Review.

Operational Contingency Plan - A risk reduction tool to establish contingency plans for high-risk components.

Operational Readiness Review (ORR) - Review held at the program level to assure readiness for operation of the integrated spacecraft for preflight testing and operations.

Part - The smallest individual piece of a subassembly which cannot be disassembled. The selection of parts is dictated by the payload classification and is subject to the NASA Standard Parts Program.

Payload Classifications - The NASA designation classifying each program/payload according to the criticality of the mission to NASA and national objectives, program cost, and the acceptable level of risk of a partial or complete failure. The payload classifications are:

Class A - High Priority, Minimum Risk
Class B - High Priority, Medium Risk
Class C - Medium Priority, Medium/Low Risk
Class D - High Risk, Minimum Cost

Performance Measure Relative Importance - Weighing factors which indicate which performance measures are of greater or lesser criticality to the customer. These factors are used in decision analysis.

Performance Measures - Variable parameters which are used to determine the degree to which alternative concepts can satisfy the project goals. The attributes used for configuration trade studies.

Performance Measures Statement - A listing and explanation of the performance measures including their relative importance. May be contained in the Goals Analysis Document. Also referred to as Performance Measures Document.

Performance Requirements - A requirement that specifies a performance characteristic that a system must possess to achieve a project goal.

Performance Verification Matrix - See Verification and Validation Plan.

Phase A - Preliminary Analysis (Requirements definition and conceptual trade studies) - The second segment in the NASA/LaRC project life cycle in which requirements are refined and candidate designs are investigated in depth. Phase A culminates with a preferred system concept and plans for development of that concept, including a Mission Need Statement when required.

Phase B(1) - Definition (Concept definition and preliminary design) - The stage of the project life cycle where the baseline system concept is established with understanding of the full range and implications of implementing the proposed project sufficient to make an Agency commitment. The PDR is accomplished in Phase B.

Phase B(2) (Source selection process) - The stage of the project life cycle designated for the acquisition of major contracted support or contract end items.

Phase C - Design (Final design and engineering development) - The stage of the project life cycle where the system is completely analyzed and designed, test and verification plans are defined, and hardware and software models are developed. The CDR is accomplished in Phase C.

Phase D - Development (Fabrication, integration, test, and evaluation) - The stage of the project life cycle where the system hardware and software elements or parts are purchased, developed, or fabricated; assembled; tested; and the integrated system is verified, validated, and delivered.

Phase E - Operations (Preflight and flight mission operations and disposal) - The project life cycle stage in which the developed system is prepared for flight, placed in orbit, and operated until the completion of its mission and then shut down or disposed.

Phase Project Team - Those individuals that have been assigned by LaRC management to participate in a given segment of the project.

Phase Study Plan - The delineation of a detailed strategy and schedule for accomplishing established objectives of a given life cycle phase.

Physical Configuration Audit (PCA) - A control gate that verifies the physical configuration of the product that corresponds to the "build-to" (or "code-to") documentation previously approved at the CDR.

Physical Requirements - A requirement that specifies a physical

characteristic that a system must possess.

Preliminary Design Drawings - The initial design drawings that are presented at the Preliminary Design Review.

Preliminary Design Review (PDR) - A critique of the system occurring in Phase B to determine the adequacy of the overall system preliminary design and project progress. A series of reviews may be held to address specific segments or lesser entities in the system hierarchy.

Preliminary Systems Requirements Review (PSRR) - Review held early in Phase A to demonstrate that preliminary systems requirements have been defined.

Pre-Phase A (Preliminary Requirements and Concepts Analysis) - The initial stage of the NASA/LaRC project life cycle in which required system performance, project constraints, and candidate system concepts are defined, analyzed, and documented.

Pre-Shipment Readiness Review (PSRR) - A review held after the completion of the major acceptance testing and prior to shipment to assure the readiness of the flight system and project/mission plans. See System Acceptance Review.

Principal Investigator (PI) - The primary customer for research developments.

Product Assurance Plan - A document, developed by the project product assurance engineer, which implements a product assurance program including safety, reliability, and quality control.

Program - A related series of long term efforts directed toward a broad scientific or technical goal and funded by NASA Headquarters appropriations.

Program Associate Administrator (PAA) - The NASA Headquarters official responsible and accountable for formulation and implementation of a major system program.

Program Commitment Agreement (PCA) - The contract between the Administrator and the cognizant PAA for implementation of a major system program.

Program Cost Commitment (PCC) - The cost ceiling established by the Administrator for the life cycle costs of a major system program.

Program Evaluation and Review Technique (PERT) - A formal, structured method for monitoring and controlling the scheduling and integration of a project.

Program Operating Plan (POP) - Time phased projection of Center resource utilization; includes narrative describing planned activities and over-guideline fiscal requirements.

Programmatic Performance Measure - A parameter, such as life cycle cost or development time, which is used as an indication of the extent to which non-technical project goals have been satisfied.

Project - Normally an element of a program, a project is an activity with clearly defined team membership, objectives, schedule, and cost intended to gain knowledge, create a capability, or provide a service. A project includes the definition, design, development, fabrication, verification, operations, data analysis and distribution, information extraction, technology transfer, and disposal of a system.

Project Data Base - A structured collection of information that captures and relates the detailed history, goals, requirements, resources, results, system configuration, and so forth, of the project.

Project Goals - The statement of the project's basic purpose and desired end result together with the technical and administrative objectives targeted for achievement.

Project Impact/Vision Statement - A written statement of the anticipated scientific, technological, and social changes that would occur due to the successful completion of the project.

Project Initiation Agreement (PIA) - An agreement between the Program Associate Administrator and the Director of a Center in charge of the project. The PIA outlines a new project's management and technical strategies, acquisition plan, schedule, resource estimates, cost, contingency reserves, and all other project ground rules. The Project Initiation Agreement is superseded by the approved Project Plan.

Project Justification Statement - A written statement giving reasons as to why pursuit of the science goals is a worthwhile endeavor.

Project Manager - The field installation official who is exclusively responsible for project definition and implementation to completion within a given set of boundary conditions (technical, cost, schedule, and organization approach).

Project Plan - The document prepared by the field installation that establishes the overall plan for implementation of the project. The Project Plan emphasizes the management and programmatic aspects of the project rather than technical information, and establishes the agreement(s) between the PAA and the involved FID's (Single Field Installation Programs), or between the program manager at the HFI and the field installation project managers (Multiple Field Installation Programs).

Project Requirements - The constraints and performance measures, derived

from project goals, which must be satisfied by the developed system to achieve project success.

Project Requirements Review (PRR) - Review held during Phase B to demonstrate the completion of systems requirements definition and flow-down prior to the start of preliminary design. See Systems Requirements Review.

Proto-flight - A flight quality hardware article that is used for qualification but not tested to the point of destruction. Following any refurbishment that may be required, the proto-flight article is flown in space.

Prototype - A flight quality hardware test article used for final qualification. It is generally tested beyond expected life limits and is, therefore, not refurbishable for flight. Also refers to a software model constructed for derivation and demonstration of customer requirements and performance assessment and which may evolve into production software.

Requirement - A condition or capability needed to achieve an objective. See also: Derived Requirements, Functional Requirements, Performance Requirements, Physical Requirements, Project Requirements, Science Requirements, Technical Requirements.

Requirement Originator - The person or organization that has created or requested a stated requirement.

Requirement Responsibility - The accountability for assuring that a stated requirement is implemented and verified.

Requirements Data Base - A structured collection of information that captures, organizes, and relates the project goals, detail requirements, and system configuration.

Requirements Validation - The process of evaluating the project development process to ensure compliance with the stated requirements.

Requirements Validation Plan - The delineation of a detailed strategy and schedule for accomplishing the validation of the project requirements. See also Verification and Validation Plan.

Risk - The likelihood of an undesirable event occurring and the severity of the consequences of the occurrence. The product of the probability of an undesired event and the consequences (usually in dollars) should the event occur.

Risk Assessment - The process of determining the source, probability, and severity of events which are hazardous to the project.

Risk Reduction Plan - System level plan to assess, track, and reduce risk

from the conceptual definition stage through systems verification. Also referred to as the Risk Management Plan.

Robust - Strongly formed or constructed. Having performance margin and relatively insensitive to variations in environmental parameters.

Schedule - A graphic or tabular portrayal of project activities, their duration, and their relationships to each other. See Program Evaluation and Review Technique.
Science Goal - The basic purposes and desired end result of the science experiment.

Science Plan - The document prepared by the project Principal Investigator, which describes how the results of system operation will be converted to useful scientific knowledge.

Science Requirements - The functionality required of a system in order to satisfy an identified science goal.

Segment - A major portion of a system comprised of a grouping of elements and computer software configuration items that are closely related and often physically interface.

SEIRC (Space-flight Experiment Initiatives Review Committee) Review - A review held at LaRC at the end of Phase A, under the chair of the Head, Space Projects Office, for the purpose of independently assessing the compatibility of a project with the LaRC mission, the readiness of a project to proceed, and the capability of LaRC to support the implementation of the project.

Sensitivity Analysis - A detailed review of the effects on system performance due to variations in environmental parameters. Also used in decision analysis to refer to a review of the impact of variations in performance measure relative importance on the overall ranking of various system options.

Simulation - A computerized mathematical model of a physical system that can be used to predict the performance and response of the system to a given stimulus under specific conditions.

Single Point Failure (SPF) - A portion of the system which, if failure of that portion occurs, total system failure will result.

Software Acceptance Review (SAR) - Review or series of reviews held at the end of Phase D to demonstrate the completion of software development and to formally accept the as-built software baseline.

Software Concept Review (SCR) - A review held early in Phase B and in conjunction with the Systems Requirements Review to evaluate the software

conceptual design and operational concept for economic and technical feasibility.

Software Critical Design Review (SCDR) - Review held at the end of Phase C and in conjunction with the system CDR to review the software detailed design document, unit test procedures, the user's guide, and operational procedures manual and data base design to establish that the applicable data requirements have been satisfied. A series of reviews may be held to address individual system segments or lesser entities in the system hierarchy.

Software Preliminary Design Review (SPDR) - Review held at the end of Phase B and in conjunction with the PDR to establish that the hardware/software interfaces have been defined and that the software preliminary design has been adequately completed. A series of reviews may be held to address individual system segments or computer software configuration items.
Software Requirements Review (SRR) - Review held in Phase B subsequent to the Systems Requirements Review to demonstrate that software requirements are compatible with system requirements, to establish the adequacy of the software Verification and Validation Plan, and to assess the system architecture to determine adequacy, completeness, and achievability of the system requirements.

Software Requirements Specification - The document that defines the system software specification based on an analysis and risk assessment of preliminary systems requirements to ensure that software requirements are feasible, complete, and consistent.

Software Test Readiness Review (STRR) - Review to evaluate the readiness of software items to undergo performance and verification acceptance testing.

Software Verification and Validation Plan - Overall approach used to verify and validate software across the entire project life cycle.

Source Evaluation Board or Committee - Committee responsible for establishing the criteria to be used in evaluating proposals, administering those criteria, and recommending the Contractor selection.

Spacecraft - That part of the system that supports the science instrument by providing power, stability, thermal control, structural support, and communications.

Space flight Site Test Plan - Document describing the intended instrument ground test activities on board the spacecraft.

Space-flight Experiment Initiatives Review - See SEIRC (Space-flight Experiment Initiative Review Committee) Review.

Specifications - See Design Specifications.

Specifications Traceability Matrix - Matrix used to trace design specifications to their precedent systems requirements.

Sponsoring Group Director's Review (SGDR) - A formal presentation made at the end of Pre-Phase A, to officials from the Group in which a new experiment is being developed, for the purpose of presenting the Phase A study plan and obtaining approval to proceed into Phase A.

Sponsoring Organization - The LaRC unit from which a new project originates.

Sponsoring Organization Overview Presentation - A formal offering by the sponsoring organization to the systems engineering supporting function that describes in detail the goals and requirements of the system development, and the background and current status of related work.

Statement of Project Goals - The official documentation of the project's basic goals.

Statement of Project Status - A project document produced in the early part of Pre-Phase A that states the maturity of the science experiment and consequently the initial estimate of the situation and project status. May be contained in the Goals Analysis Document.

Statement of Work (SOW) - Itemization of tasks to be accomplished in order to satisfy project and performance requirements. Typically forms the basis for con tracts with external entities.

Subassembly - Two or more parts joined together to form a unit which is only a portion of a complete assembly.

Subsystem - A functional grouping of assemblies that combine to perform a major function within an element.

Support Equipment - All items required in the operation or testing of the development end items that are not an integral part of the flight system.

System - The combination of elements that must function together to produce the capability required to meet the mission need. The elements include all hardware, software, equipment, facilities, personnel, and the processes and procedures needed for this purpose.

System Acceptance Review (SAR) - Formal review to ensure that there is a high level of confidence that the flight item has complied with mission requirements and specifications, that it will be transported safely to its destination, and that it will operate as designed upon arrival.

System Acquisition Plan - The project plan which defines the approach for acquiring major system hardware and software segments and which addresses

the "make or buy" question to specify which items will be purchased and which will be developed in-house.

System Requirements Document - See Systems Requirements Document.

System Verification Report - Summary report to show compliance of the "as-built" system with the requirements of the Verification and Validation Plan.

Systems Analysis and Design Procedure - An iterative systems engineering process used to define system goals, requirements, concepts, and development in a systematic and verifiable sequence.

Systems Engineering - A function that guides the transformation of customer/user needs into a flight system that meets the technical performance requirements within NASA/LaRC policy.

Systems Engineering Data Base - A project oriented data base used to control, allocate, and track systems requirements and documentation.

Systems Engineering Process - A set of iterative activities which applies systems engineering to a project.
Systems Integration Document - Formal plan for the integration of subsystems, elements, and segments into the system and subsequent integration of the system into the spacecraft and launch vehicle.

Systems Requirements Document - A written report clearly delineating the requirements of the project. A preliminary document is created in Pre-Phase A and the final Systems Requirements Document is produced early in Phase B.

Systems Requirements Review (SRR) - Review to define the project objectives and confirm that the system requirements are sufficient. A concept is presented which will identify subsystems and their resource allocations. Successful completion of the SRR baselines the science/mission objectives and subsystem allocations and approves the initiation of the preliminary design.

Systems Simulation Model - A theoretical or simulated mathematical model of the system that accepts inputs, produces outputs, and performs the specified functions of the system.

Technical Performance Measure - A parameter which is used as an indication of the extent to which the technical science/project goals have been satisfied. See also Performance Measures.

Technical Requirements - A condition or capability needed to satisfy a physical requirement, constraint, technical goal, or technology development.

Test Plan - A document prescribing the approach for intended test activities.

Test Readiness Review (TRR) - A review or series of reviews to evaluate the readiness of the system or parts of the system to undergo performance and environmental testing.

Trade Study - An analytical process that compares critical parameters of various alternate concepts for the purpose of determining the preferred configuration. Also referred to as tradeoff analysis.

Validation - The process that assures that the system will comply with the science and performance requirements.

Verification - The process to establish that subsystems and individual configuration items comply with specifications.

NOTE: Verification vs. validation. The significant difference between validation and verification should be made distinct. Verification consists of proof of compliance with specifications and can be demonstrated by test, analysis, inspection, or similarity. Conversely, validation consists of various proofs that the system accomplishes or can accomplish its goals. Validation is accomplished at the system level; verification is accomplished throughout the entire system architectural hierarchy.

Verification and Validation Plan - Systems level plan for system hardware and software verification and validation by test, analysis, inspection, or similarity. Includes the Performance Verification Matrix used to track system verification criteria. See also Software Verification and Validation Plan.

Verified Assemblies - Integrated parts and subassemblies that have been analyzed and tested in order to prove that the unit adheres to requirements.

Verified Subsystems - Integrated entities that have been analyzed and tested in order to prove that the subsystem adheres to requirements.

Verified System - Integrated subsystems that have been analyzed and tested in order to prove that the system adheres to requirements.

Vision - The anticipated scientific, technological, and social changes that would occur due to the successful completion of the project. Includes impact of successful project completion and consideration of technology transfer and utilization.

Work Breakdown Structure (WBS) - A hierarchical structured diagram that delineates the tasks to be performed to accomplish the project goals and the organizations that are responsible for those tasks.

**Continue to Next Section**